RESEARCH, DEVELOPMENT & TECHNOLOGY TRANSFER
QUARTERLY PROGRESS REPORT

Wisconsin Department of Transportation
DT1241 8/2010

INSTRUCTIONS:
Research project investigators and/or project managers should complete a quarterly progress report (QPR) for each calendar quarter during which the projects are active.

WisDOT research program category: ☐ Policy research ☒ Wisconsin Highway Research Program ☐ Other ☐ Pooled fund TPF#	Report period year: 2011 ☒ Quarter 1 (Jan 1 – Mar 31) ☐ Quarter 2 (Apr 1 – Jun 30) ☐ Quarter 3 (Jul 1 – Sep 30) ☐ Quarter 4 (Oct 1 – Dec 31)

Project title: Laboratory Study of Concrete Properties to Support Implementation of the New AASHTO Mechanistic-Empirical Pavement Design Guide		
Project investigator: Steve Cramer	Phone: 608-265-2001	E-mail: cramer@engr.wisc.edu
Administrative contact: Peg Lafky	Phone: 608-266-3663	E-mail:
WisDOT contact: Barry Paye/James Parry	Phone:	E-mail:
WisDOT project ID: 0092-11-05	Other project ID:	Project start date: 10/21/2010
Original end date: 10/20/2011	Current end date: 10/20/2011	Number of extensions: 0

Project schedule status:
☐ On schedule ☐ On revised schedule ☐ Ahead of schedule ☒ Behind schedule

Project budget status:

Total Project Budget	Expenditures Current Quarter	Total Expenditures	% Funds Expended	% Work Completed
$102,000.00	$14429	$18,923.00	19%	29%

Project description:
The strength and durability of concrete paving materials are largely dependent on the curing conditions under which the structure is maintained at an early age. Large scale concrete paving operations present unique challenges that prevent the implementation of curing strategies other than the application of membrane forming curing compounds (MFCCs). The method of action of curing compounds is unknown other than that they prevent evaporation via the formation of a hydrophobic membrane. Curing compounds have a variety of formulations and chemistries that affect the nature of this membrane, its effectiveness at preventing evaporation, and interaction with the curing concrete surface. This situation is further complicated when supplemental cementitious materials (SCMs including slag, fly ash, etc.) are included in the concrete design.
The objectives of this research are to:

1. Evaluate the scaling resistance of concrete materials prepared with several different MFCCs and SCMs.
2. Evaluate the chloride ion penetration resistance of the above materials
3. Evaluate the effectiveness of several MFCCs at preventing evaporation of water from concrete surfaces.
4. Attempt to determine the microstructural consequences of curing concrete pavements with MFCCs.

Progress this quarter (includes meetings, work plan status, contract status, significant progress, etc.):
In this quarter the team focused on primarily on sample preparation. Scaling resistance testing and other testing commenced.

1. A literature review document has been completed and will continue to be updated over the course of the project
2. Concrete specimens treated with polyalphamethylstyrene, linseed oil emulsion, clear acrylic, clear chlorinated rubber, and wet room curing have been prepared. Freeze-thaw cycling and long term ponding in deicer solutions has begun.
3. A wax emulsion curing compound was identified and received for preparation of additional control samples.

Anticipated work next quarter:

Work next quarter will be focused on final sample and control preparation and continuing the long term ponding for ASTM C672 and C1543 testing. An additional set of control samples treated with wax based emulsion will be prepared and subjected to identical experimental conditions.

1. Preparation of a second set of control samples with a wax emulsion curing compound
2. ASTM C39, AASHTO T119, T152, T121 testing of second control specimens
3. Concrete specimens subjected to freeze/thaw cycling and chloride ponding for ASTM C672 and C1543 testing

Circumstances affecting project or budget:
The project is slightly behind schedule as the 12 month time frame for a laboratory project of this type is very tight and difficult to achieve.

Insert Gantt chart and other project documentation – attach additional pages if necessary
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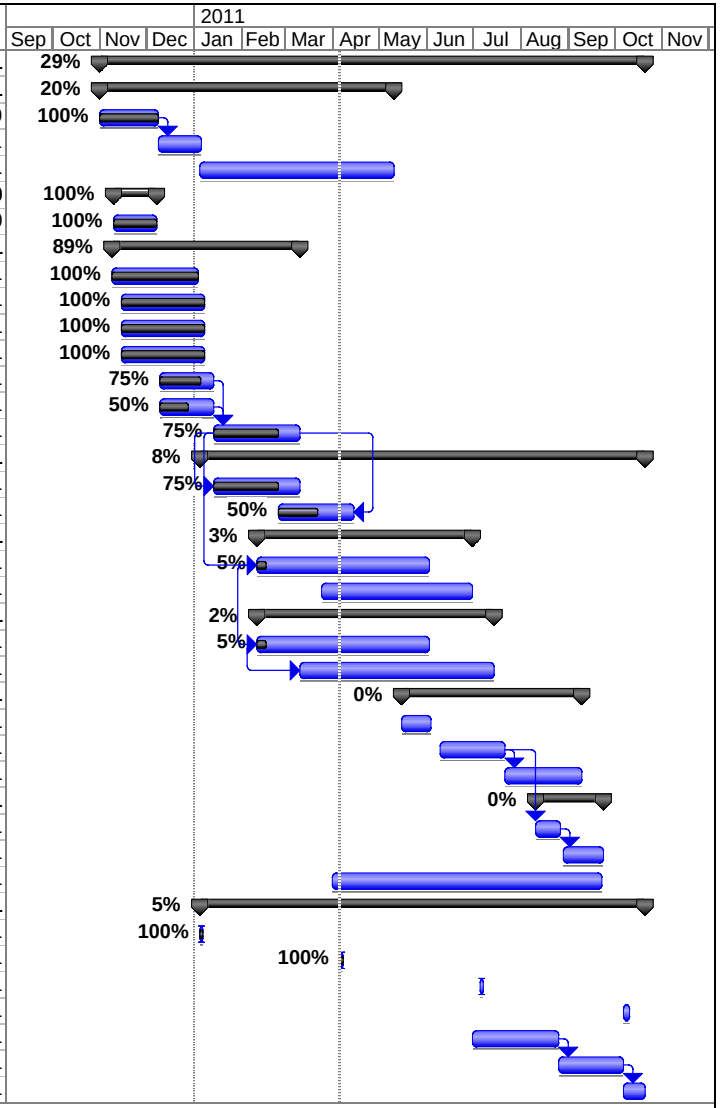
Staff receiving QPR:	Date received:
Staff approving QPR:	Date approved:

ID	Task Name	Duration	Start	Finish
1	**Overall Project Progress**	**254 days**	**Mon 11/1/10**	**Thu 10/20/11**
2	**Literature Review**	**137 days**	**Mon 11/1/10**	**Tue 5/10/11**
3	Review Literature	28 days	Mon 11/1/10	Wed 12/8/10
4	Prepare summary	20 days	Thu 12/9/10	Wed 1/5/11
5	Update literature review as necessary	90 days	Wed 1/5/11	Tue 5/10/11
6	**Research Plan**	**20 days**	**Wed 11/10/10**	**Tue 12/7/10**
7	Finalize testing matrix	20 days	Wed 11/10/10	Tue 12/7/10
8	**Concrete Specimen Preparation**	**88 days**	**Tue 11/9/10**	**Thu 3/10/11**
9	Selection and receipt of aggregates	40 days	Tue 11/9/10	Mon 1/3/11
10	Selection and receipt of cement	40 days	Mon 11/15/10	Fri 1/7/11
11	Selection and receipt of fly ash and slag	40 days	Mon 11/15/10	Fri 1/7/11
12	Selection and receipt of curing compounds	40 days	Mon 11/15/10	Fri 1/7/11
13	Mix material characterization	25 days	Fri 12/10/10	Thu 1/13/11
14	Mold preparation	25 days	Fri 12/10/10	Thu 1/13/11
15	Concrete specimen fabrication	40 days	Fri 1/14/11	Thu 3/10/11
16	**Concrete Specimen Evaluation**	**207 days**	**Wed 1/5/11**	**Thu 10/20/11**
17	Plastic concrete evaluation	40 days	Fri 1/14/11	Thu 3/10/11
18	ASTM C39 testing	35 days	Fri 2/25/11	Thu 4/14/11
19	**ASTM C672 testing**	**100 days**	**Fri 2/11/11**	**Thu 6/30/11**
20	Freeze-thaw testing	80 days	Fri 2/11/11	Thu 6/2/11
21	SEM imagining and microstructural analysis	70 days	Fri 3/25/11	Thu 6/30/11
22	**ASTM C1543 testing**	**110 days**	**Fri 2/11/11**	**Thu 7/14/11**
23	Ponding/exposure	80 days	Fri 2/11/11	Thu 6/2/11
24	Chloride testing	90 days	Fri 3/11/11	Thu 7/14/11
25	**ASTM C169 testing**	**85 days**	**Mon 5/16/11**	**Fri 9/9/11**
26	Fabricate mortar molds	15 days	Mon 5/16/11	Fri 6/3/11
27	Prepare mortar specimens C169 and C156	30 days	Fri 6/10/11	Thu 7/21/11
28	Evaluate mortar specimens	36 days	Fri 7/22/11	Fri 9/9/11
29	**ASTM C156 testing (if possible)**	**32 days**	**Thu 8/11/11**	**Fri 9/23/11**
30	Determine evaporation performance of chamber	12 days	Thu 8/11/11	Fri 8/26/11
31	Evaluate specimens	20 days	Mon 8/29/11	Fri 9/23/11
32	Data analysis	125 days	Fri 4/1/11	Thu 9/22/11
33	**Reporting**	**207 days**	**Wed 1/5/11**	**Thu 10/20/11**
34	Quarterly report 1	2 days	Wed 1/5/11	Thu 1/6/11
35	Quarterly report 2	2 days	Wed 4/6/11	Thu 4/7/11
36	Quarterly report 3	2 days	Wed 7/6/11	Thu 7/7/11
37	Quarterly report 4	2 days	Fri 10/7/11	Mon 10/10/11
38	Final report preparation	40 days	Fri 7/1/11	Thu 8/25/11
39	Final report review and revision	30 days	Fri 8/26/11	Thu 10/6/11
40	Final report submission	10 days	Fri 10/7/11	Thu 10/20/11



Project: Curing Compounds 040511
Date: Tue 4/5/11

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline